

Interim Chemical/Biological Monitoring Protocol For Coal Mining Permit Applications*

January 19, 2000

I. Introduction/Background

Four Federal agencies (U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Office of Surface Mining, U.S. Army Corps of Engineers), and the West Virginia Division of Environmental Protection have been examining information requirements and possible improvements to biological and water quality monitoring programs for mountaintop mining operations. On July 27, 1999, a draft protocol for chemical/biological monitoring was put on EPA's mountaintop mining webpage, and comments were solicited from the public during the months of August and September. Written comments were received from 19 entities concerning the draft protocol, and a follow-up meeting was held on October 26, 1999 in Morgantown, West Virginia with many of those who had submitted comments. A revised document was prepared on November 12, 1999 and once again put on the web page for public comment. A second meeting to discuss the revised draft protocol was held on December 6, 1999 at the WVDEP offices in Nitro, West Virginia, and written comments were accepted until January 11, 2000, at which time a third and final meeting was held in the offices of the West Virginia Coal Association in Charleston, WV to finalize the document. Questions regarding the document can be directed to Mr. William J. Hoffman (3ES30), U.S. Environmental Protection Agency, 1650 Arch Street, Philadelphia, PA 19103-2029. Mr. Hoffman can also be reached at (215) 814-2995 or at *Hoffman.William@epa.mail* to discuss the protocol.

The primary purpose of this draft interim monitoring procedure is to develop guidelines for monitoring practices that will provide useful information upon which permit decisions can be based, including Clean Water Act Section 404 permitting decisions; and to provide useful information upon which mitigation/reclamation procedures can be developed and evaluated, both from a site-specific and cumulative impact frame of reference. The guidance does not remove or replace any monitoring or reporting requirements mandated by statute or regulation, and will be reevaluated at the conclusion of the programmatic EIS now being prepared by EPA, OSM, COE, and FWS in consultation with WV, KY, and VA. These protocols are to be considered guidelines rather than strict requirements. Actual parameters to be monitored, monitoring station locations, and monitoring frequencies may be revised based upon project specific information presented by applicants during pre-application meetings. Further, this protocol will generally apply only to: 1) projects having one or more fills affecting a drainage area greater than 250 acres, or 2) valley fill projects that individually or in combination with other valley fill projects (past, present, or currently permitted), impact greater than 25% of the watershed area as defined in II.A. below. Finally, these procedures are not intended for AML or reining projects that are being designed to correct environmental problems from historic mining operations.

II. Monitoring Requirements

A. Permit Phase

Prior to submitting the permit application to the State or Corps of Engineers, the evaluation of premining baseline conditions is recommended over two index periods: a winter/spring index period (February 15 to April 15) and a fall/winter index period (October 15 to December 30) for water chemistry and benthics; and over a spring index period (April 1-June 15) for fish.

Alternative sampling periods should be approved by the permitting agencies. The exact dates that monitoring information is collected should be recorded. QA/QC procedures employed in the collection of the data should also be recorded (sampling methods, chain of custody procedures, laboratory testing methods, etc). For comparative purposes, water chemistry and benthic samples should be collected simultaneously at each of the monitoring locations. This information would be used to assess direct, site specific impacts of the proposed action, and to develop mitigation measures to avoid or reduce impacts during the operation.

As part of the permit process, the applicant should also assess potential cumulative impacts to the watershed. For assessment purposes, it is recommended that the watershed to be assessed begin at least one receiving stream downstream of the mining operation and extend to the headwaters. The CHIA process, which has been used to evaluate cumulative hydrologic effects, should continue to be implemented for that purpose. However, as cumulative biological effects have not historically been assessed during the CHIA process, the applicant should propose a means of assessing the long term cumulative biological impacts of the operation on the watershed so as to fully inform the permitting process. One possible example of such a cumulative impact assessment process follows. First, the applicant could determine the size of the watershed prior to any mining having occurred within that watershed; the stream miles located within the premining watershed; the percentage of stream miles within that watershed that have or will be impacted by past, present, and future mining operations; and the percentage of stream miles within that watershed that have or will be covered by valley fills associated with those mining operations. The applicant could then attempt to establish a reference area by locating a “mined” watershed with similar characteristics (watershed size, stream miles within the watershed, elevation of the watershed, size and age distribution of valley fills within the watershed, percent active/inactive mining in the watershed, land use and geology in the watershed, etc.) that is considered representative of the future impact scenario; position a downstream monitoring station within that “mined” watershed; and assess the chemical and biological conditions that have resulted from that level of mining within that watershed.

B. Mining Phase (Through Phase I Reclamation)

Where possible (some stations may be eliminated once mining has begun), semi-annual benthic and chemical (winter/spring and fall/winter index periods), and annual fish (spring index period) samples should be taken at stations where baseline data was collected, and submitted to the permitting agencies to assess the effectiveness of water quality controls in protecting downstream water quality and/or aquatic life. Contingency measures may be required to mitigate observed impacts to downstream resources of concern.

C. Reclamation Phase

One survey is recommended following Phase II but prior to final release. Benthic (winter/spring or fall/winter index periods), fish (spring index period), and corresponding chemical samples should be taken at stations where mining phase data was collected to assess the effectiveness of reclamation efforts in protecting downstream water quality and/or aquatic life. Additional reclamation efforts may be required as necessary to mitigate observed impacts to downstream resources of concern.

III. Monitoring Parameters

A. Chemistry

The following parameters are recommended for measurement during each chemistry monitoring period: pH, dissolved iron, dissolved manganese, dissolved aluminum, calcium, magnesium, sodium, potassium, chloride, total suspended solids, total dissolved solids, instantaneous temperature, conductivity, alkalinity, acidity, sulfate, dissolved organic carbon, dissolved oxygen, hardness, nitrate/nitrite, total phosphorous, and measured flow.

The following parameters are recommended for measurement during the assessment of baseline conditions and prior to NPDES renewal, with additional monitoring to be required if applicable state water quality standards are exceeded: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc.

Please refer to Attachment I for suggested methods for analyzing the above listed parameters, and detection limits for the listed methods.

As indicated above, these protocols are to be considered guidelines, not strict requirements. Actual parameters to be monitored and monitoring frequencies may be revised based upon project specific information presented by applicants during pre-application meetings, and as appropriate, after mining has begun.

A quality assurance/quality control plan should be developed for each project. During the interim period, the chemical survey plan developed for the programmatic EIS should be used as a minimum guideline for preparing these survey plans. This survey plan will be posted on EPA's mountaintop mining webpage at <http://www.epa.gov/region3/mtntop> in the near future, and/or can be requested in hard copy from Mr. Gary Bryant, U.S. Environmental Protection Agency, 1060 Chapline Street, Suite 303, Wheeling, WV. Mr. Bryant can also be reached at (304) 234-0230 or at *Bryant.Gary@epa.gov*.

B. Biological

1. Benthic Resources

It is recommended that the applicant conduct a quantitative survey of benthic resources at the designated monitoring locations, and that voucher specimens be collected and preserved for a reasonable time period (a minimum of 6 months). These samples should be made available to the permitting agencies for further analysis upon request. Recommended collection techniques are provided at <http://www.epa.gov/owow/monitoring/rbp/>. Once a collection technique is proposed, the same technique should always be used at that station if possible. Further, regardless of the collection technique utilized, all organisms in the sample or sub-sample should be identified to the lowest practical taxon.

Prior to mining and preferably prior to any disturbance, including timbering, a physical habitat characterization and substrate size characterization (as used within the benthic survey plan developed for the programmatic EIS) should be performed within each benthic sampling station. In addition, riparian habitat should be described using methods seen in *Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams* (EPA/620/R-94/004F, September 1998). Photographs could also be taken at each site and included in the report.

A quality assurance/quality control plan should be developed for each project. During the interim period, the benthic survey plan developed for the programmatic EIS should be used as a minimum guideline for preparing these survey plans. This survey plan will be posted on EPA's mountaintop mining webpage at <http://www.epa.gov/region3/mtntop> in the near future, and/or can be requested in hard copy from Mr. William J. Hoffman (3ES30), U.S. Environmental Protection Agency, 1650 Arch Street, Philadelphia, PA 19103-2029. Mr. Hoffman can also be reached at (215) 814-2995 or at Hoffman.William@epa.mail.

2. Fishery Resources

Fisheries surveys to produce estimates of standing crop by species should be conducted prior to the initiation of mining, and preferably prior to any land disturbance on the site, including timbering. These surveys should be of sufficient number and distribution to be fully representative of all aquatic habitats represented on the bonded area, with at least one site established at the most-downstream extent of the impact area (see monitoring station location discussion below). All sites should be permanently recorded. GPS is recommended for recording station locations. During mining, a yearly survey sufficient to produce standing crop by species estimates and identical to those described above should be conducted at the permanently recorded, most-downstream site(s). After mining has been completed, a final survey should be conducted at the permanently recorded, most-downstream site(s). This final survey should be conducted following Phase II but prior to final bond release.

Sampling protocols utilizing electro-fishing methods are recommended, and should generally follow the protocol described in Section 12 Aquatic Vertebrates by McCormick and Hughes (pp 161-182) in *Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams* (EPA/620/R-94/004F, September 1998). The single largest exception to the protocol is that sufficient surveying effort should be expended (i.e. bank-to-bank coverage) to

allow calculation of standing crop estimates by species. Specific guidance may be provided by the permitting agency when applicable Scientific Collecting Permits are issued.

Scientific Collecting Permits for conducting these surveys should be applied for from the appropriate agency. Data and voucher specimens from these surveys should also be made available to the applicable permitting agencies as requested.

A quality assurance/quality control plan should be developed for each project. During the interim period, the fisheries survey plan developed for the programmatic EIS should be used as a minimum guideline for preparing these survey plans. This survey plan will be posted on EPA's mountaintop mining webpage seen at <http://www.epa.gov/region3/mtntop> in the near future, and/or can be requested in hard copy from Ms. Cindy Tibbott at U.S. Fish and Wildlife Service, Suite 322, 315 South Allen Street, State College, PA 16801. Ms Tibbott can also be reached at (814) 234-4090 or at Cindy_Tibbott@fws.gov.

IV. Monitoring Station Locations During Permitting, Mining & Reclamation Stages

A. Site Specific Effects

A minimum of two biological/water chemistry monitoring stations are recommended for each intermittent and perennial stream where fills are proposed within the mining operation. One station should be located in the fill area as close as possible to the toe of the fill. Information from this station would be used to inform the permitting process by providing direct impact data. A second station should be located downstream of the proposed sediment pond location, which would be used to assess longer term effects of the discharge from the fill on downstream segments. A third station is recommended if the sediment pond is to be located more than 1/4 mile from the toe of the fill, and should be located between the toe of the proposed fill and the proposed sediment pond. Monitoring is recommended at this third location during the permit phase to provide baseline chemical and biological data to inform the permitting process, and once after Phase III bond release to assess the long term impacts that have occurred within this stream segment.

The applicant will also attempt to identify at least one reference monitoring site within the watershed to be mined against which impacts can be compared throughout the life of the project.

B. Cumulative Effects

In addition to the biological/water chemistry monitoring stations described above, additional monitoring stations should be placed within at least the first receiving stream downstream of the mining operation. These stations, which should be located upstream and downstream of the confluence point with the valley fill impacted stream(s), would be used to assess the cumulative impact of the operation on this downstream location.

V. Mitigation/Reclamation Procedures

Information obtained from baseline monitoring will be used to develop control procedures to be employed to protect water quality and downstream biological resources during and after the mining operation. These protective measures will be developed during the permitting process and evaluated during mining and reclamation. Where resources of concern are identified during the application process, additional controls may be required as necessary during the life of the project to minimize unabated effects discovered during the ongoing monitoring process. These resources of concern will typically be identified prior to the initiation of the mining operation.

*The coal mining operations for which this guidance has been developed are defined within the *Memorandum of Understanding Among the U.S. Office of Surface Mining, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and West Virginia Division of Environmental Protection for the Purpose of Providing Effective Coordination in the Evaluation of Surface Coal Mining Operations Resulting in Placement of Excess Spoil Fills in the Waters of the United States*, dated April 7, 1999, and are incorporated herein by reference.

Attachment I

Parameters, Methods, and Detection Limits		
Parameter	Method	Detection Limits (ug/L)
Flow Rate	USGS stream gaging protocol modified to use single- axis electromagnetic velocity meter	NA
Temperature (EC), Dissolved Oxygen (mg/l), pH (su), Conductivity (uS/cm)	Hydrolab type multiparameter field meter, <i>in situ</i> .	NA
Total Suspended Solids	EPA 160.2	4000
Total Dissolved Solids	EPA 160.1	10, 000
Acidity	EPA 305.1	10,000
Alkalinity	EPA 310.1	2,000
Sulfate	EPA 300.0	20
Chloride	EPA 300.0	20
Nitrate	EPA 300.0	2.0
Nitrite	EPA 300.0	4.0
Total Phosphorous	EPA 365.4	10
Hardness	Calculate using calcium and magnesium - SM 2340B	30
Dissolved Organic Carbon	EPA 415.1	1,000
Dissolved Aluminum	EPA 200.7 (ICP optical)	20
Antimony	EPA 200.9 (Graphite furnace)	0.8
Arsenic	EPA 200.9	0.5
Beryllium	EPA 200.7	0.3
	***** EPA 200.9	***** 0.02
Cadmium	EPA 200.7	1.0
	***** EPA 200.9	***** 0.05
Calcium	EPA 200.7	10

Parameters, Methods, and Detection Limits		
Parameter	Method	Detection Limits (ug/L)
Chromium VI	EPA 218.6	0.3
Copper	EPA 200.7	2.0
Dissolved Iron	EPA 200.7	30
Lead	EPA 200.9	0.7
Dissolved Manganese	EPA 200.7	1.0
Magnesium	EPA 200.7	20
Mercury	EPA 245.1	0.2
Nickel	EPA 200.7	5.0
Potassium	EPA 200.7	300
Selenium	EPA 200.9	0.6
Silver	EPA 200.7	2.0
	***** EPA 200.9	***** 0.5
Sodium	EPA 200.7	30
Thallium	EPA 200.9	0.7
Zinc	EPA 200.7	2.0